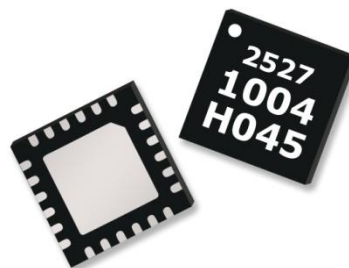


TGA2527-SM

Ku-Band Power Amplifier

Applications

- Point-to-Point Radio
- Ku-Band VSAT

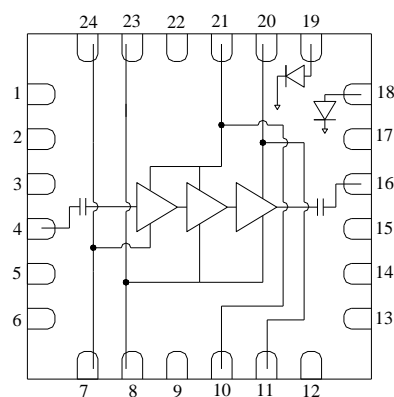


QFN 5x5mm 24L

Product Features

- Frequency Range: 12.5 – 15.5 GHz
- TOI: 41 dBm
- Power: 31.5 dBm Psat, 30 dBm P1dB
- Gain: 25 dB
- Return Loss: 10 dB
- NF: 7.5 dB
- Integrated Power Detector
- Bias: Vd = 6 V, Id = 650 mA, Vg = -0.55 V Typical
- Package Dimensions: 5.0 x 5.0 x 0.85 mm

Functional Block Diagram



General Description

The TriQuint TGA2527-SM is a Ku-Band Packaged Power Amplifier. The TGA2527-SM operates from 12.5 to 15.5 GHz and is designed using TriQuint's power pHEMT production process.

The TGA2527-SM typically provides 41dBm of TOI at 20dBm Pout/Tone, 30 dBm of output power at 1dB gain compression, and the small signal gain is 25 dB.

The TGA2527-SM is available in a low-cost, surface mount 24 lead 5x5 QFN package and is ideally suited for Point-to-Point Radio, and Ku-Band VSAT Ground Terminal.

Lead-free and RoHS compliant.

Evaluation Boards are available upon request.

Pin Configuration

| Pin # | Symbol |
|--------------------------------------|--------|
| 1, 2, 3, 5, 6, 9, 12, 13, 14, 15, 17 | N/C |
| 4 | RF IN |
| 7, 8, 23, 24 | Vg |
| 16 | RF OUT |
| 10, 11, 20, 21 | Vd |
| 18 | Vref |
| 19 | Vdet |
| 22 | GND |

Ordering Information

| Part No. | ECCN | Description |
|----------------------------------------------|-------------|-------------------------|
| TGA2527-SM | 3A001.b.2.c | Ku-band Power Amplifier |
| Standard T/R size = 500 pieces on a 7" reel. | | |

Specifications

Absolute Maximum Ratings

| Parameter | Rating |
|-----------------------------------|---------------|
| Drain Voltage, Vd | +8 V |
| Gate Voltage, Vg | -3 to 0 V |
| Drain Current, Id | 1.12 A |
| Gate Current, Ig | -5.5 to 88 mA |
| Power Dissipation, Pdiss | 9 W |
| RF Input Power, CW, 50Ω, T = 25°C | 24 dBm |
| Channel Temperature, Tch | 200 °C |
| Mounting Temperature (30 Seconds) | 260 °C |
| Storage Temperature | -40 to 150 °C |

Operation of this device outside the parameter ranges given above may cause permanent damage. These are stress ratings only, and functional operation of the device at these conditions is not implied.

Recommended Operating Conditions

| Parameter | Min | Typical | Max | Units |
|---------------------------|-----|---------|-----|-------|
| Vd | | 6 | | V |
| Id | | 650 | | mA |
| Id_drive (Under RF Drive) | | 850 | | mA |
| Vg | | -0.55 | | V |

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

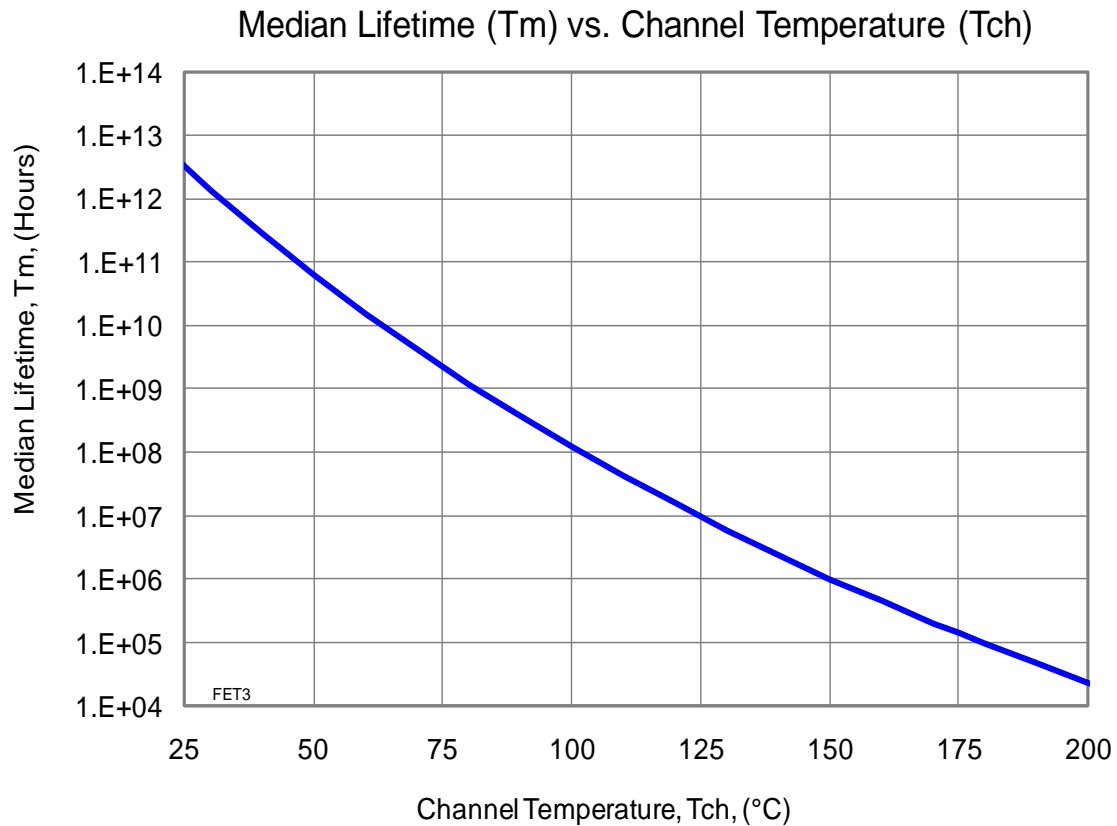
Test conditions unless otherwise noted: 25°C, Vd = 6 V, Id = 650 mA, Vg = -0.55 V Typical.

| Parameter | Min | Typical | Max | Units |
|--------------------------------------|------|---------|------|--------|
| Operational Frequency Range | 12.5 | | 15.5 | GHz |
| Gain | | 25 | | dB |
| Input Return Loss | | -10 | | dB |
| Output Return Loss | | -10 | | dB |
| Output Power @ Saturation | | 31.5 | | dBm |
| Output Power @ 1 dB Gain Compression | | 30 | | dBm |
| Output TOI @ Pout/Tone = 20 dBm | | 41 | | dBm |
| Noise Figure | | 7.5 | | dB |
| Gain Temperature Coefficient | | -0.033 | | dB/°C |
| Power Temperature Coefficient | | -0.005 | | dBm/°C |

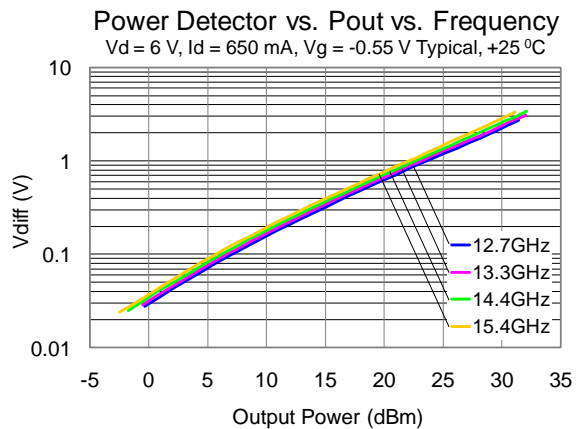
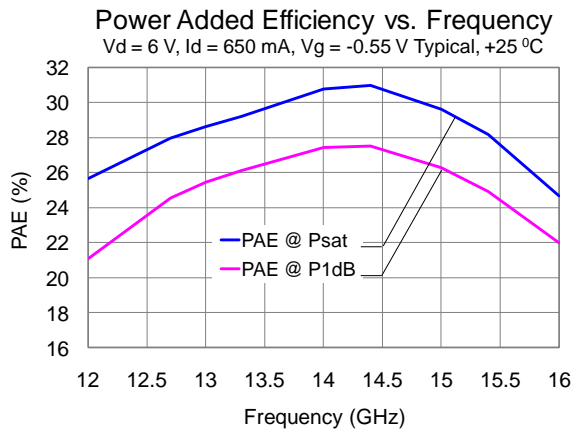
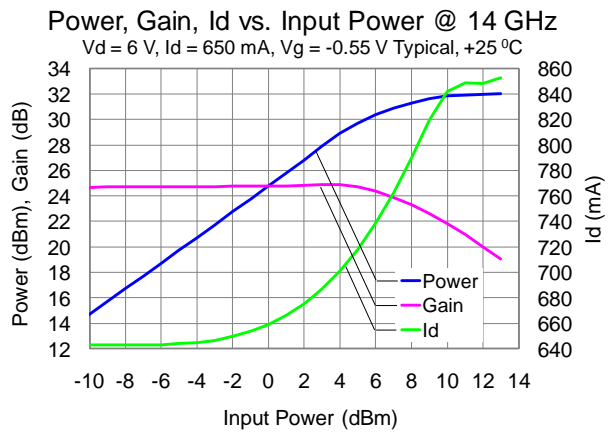
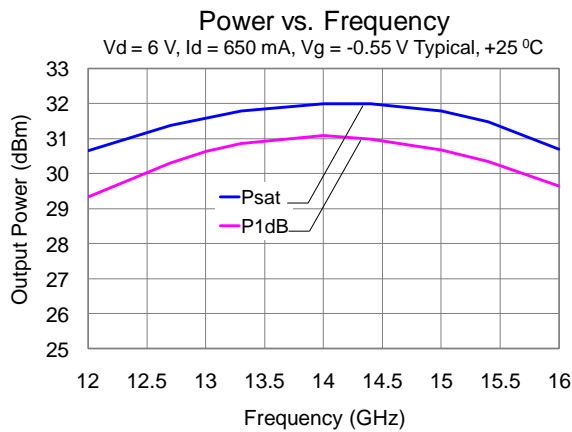
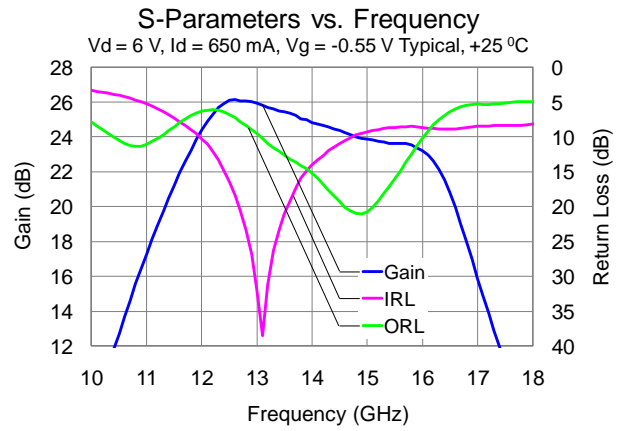
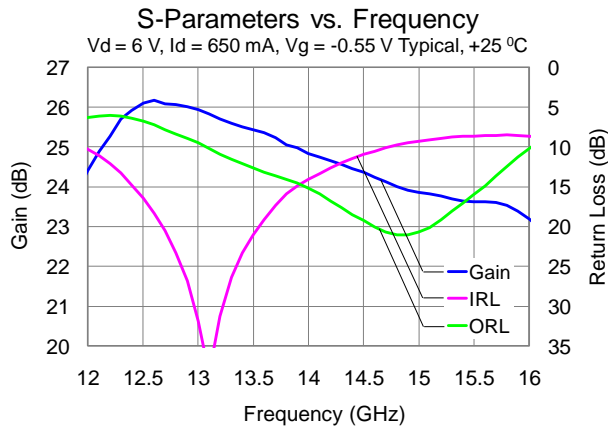
Specifications (cont.)

Thermal and Reliability Information

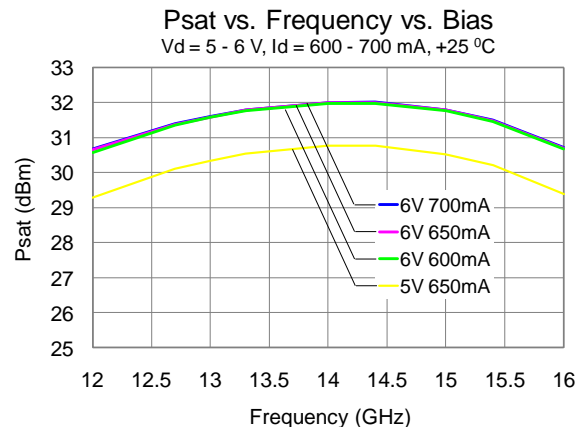
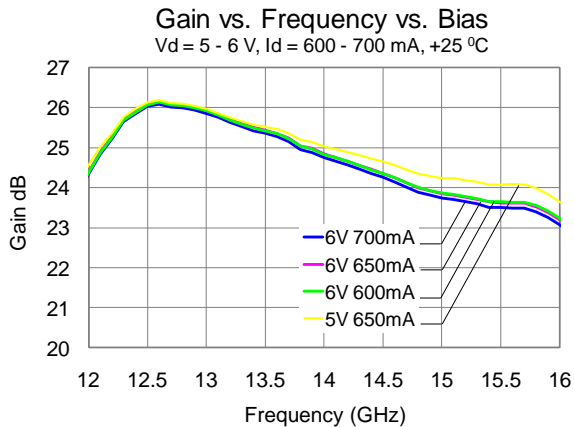
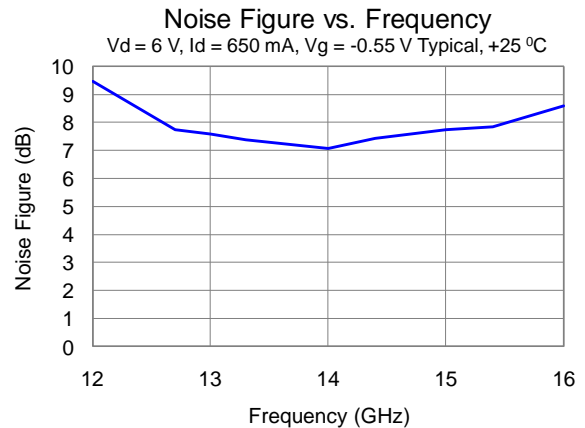
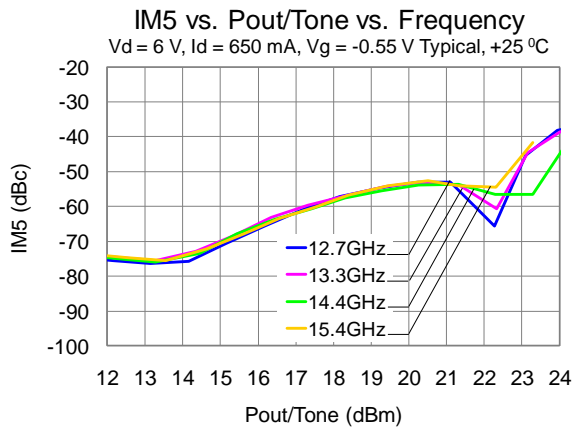
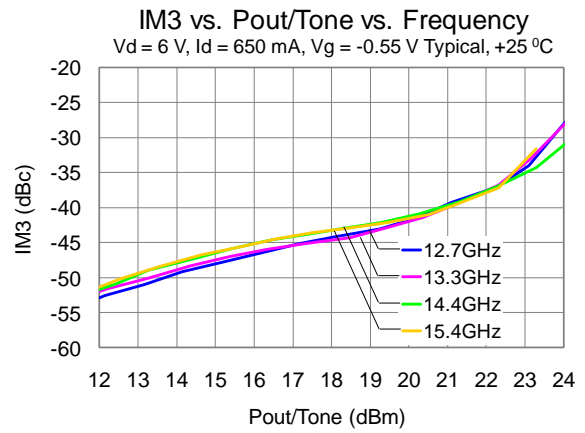
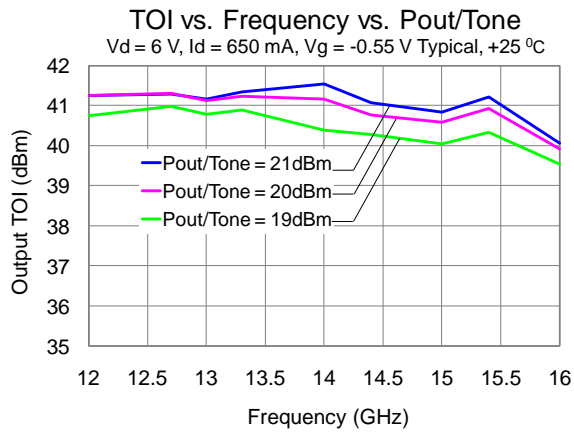
| Parameter | Condition | Rating |
|--------------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------|
| Thermal Resistance, θ_{JC} , measured to back of package | Tbase = 85 °C | $\theta_{JC} = 11.5$ °C/W |
| Channel Temperature (Tch), and Median Lifetime (Tm) | Tbase = 85 °C, Vd = 6 V, Id = 650 mA, P _{diss} = 3.9 W | Tch = 130 °C Tm = 5.9 E+6 Hours |
| Channel Temperature (Tch), and Median Lifetime (Tm) Under RF Drive | Tbase = 85 °C, Vd = 6 V, Id = 850 mA, P _{out} = 32 dBm, P _{diss} = 3.5 W | Tch = 125 °C Tm = 9.5 E+6 Hours |



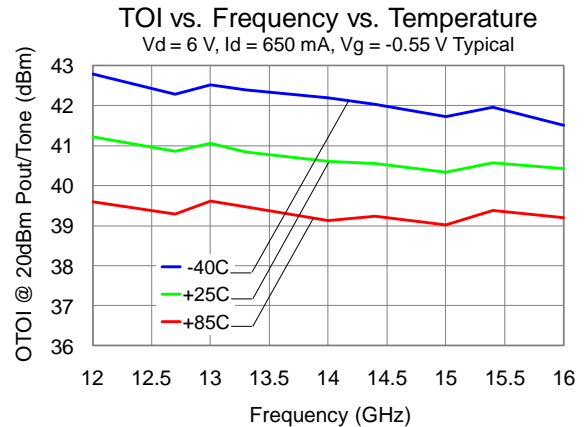
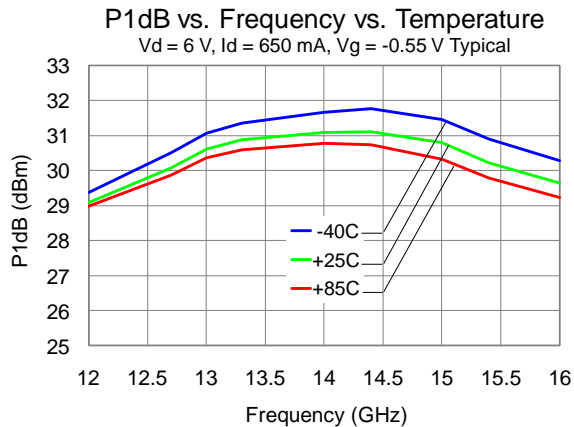
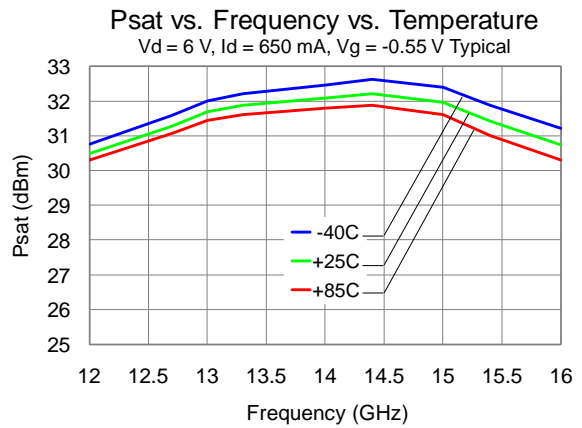
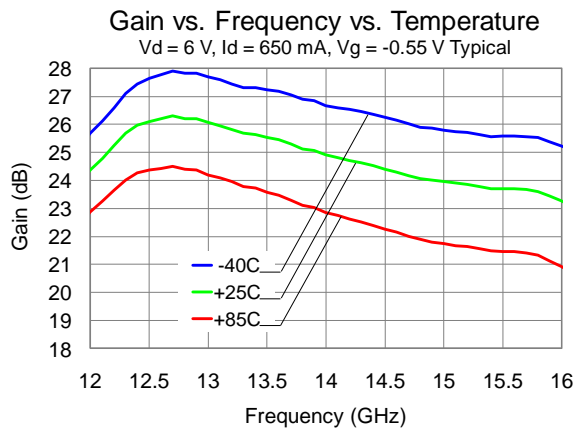
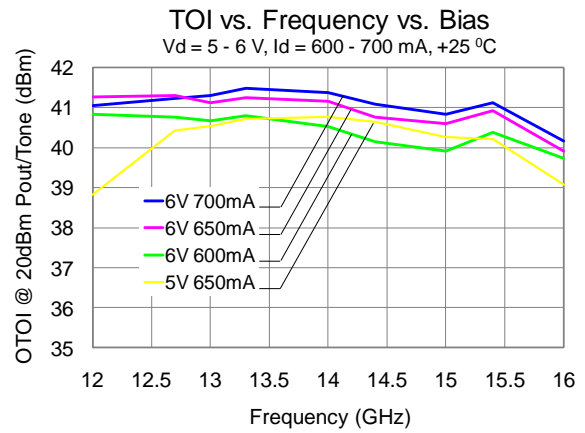
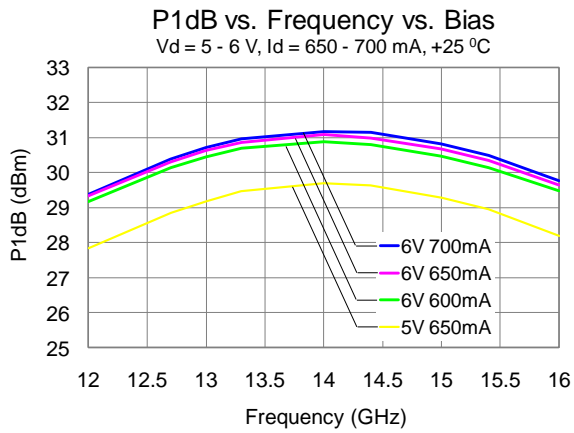
Typical Performance



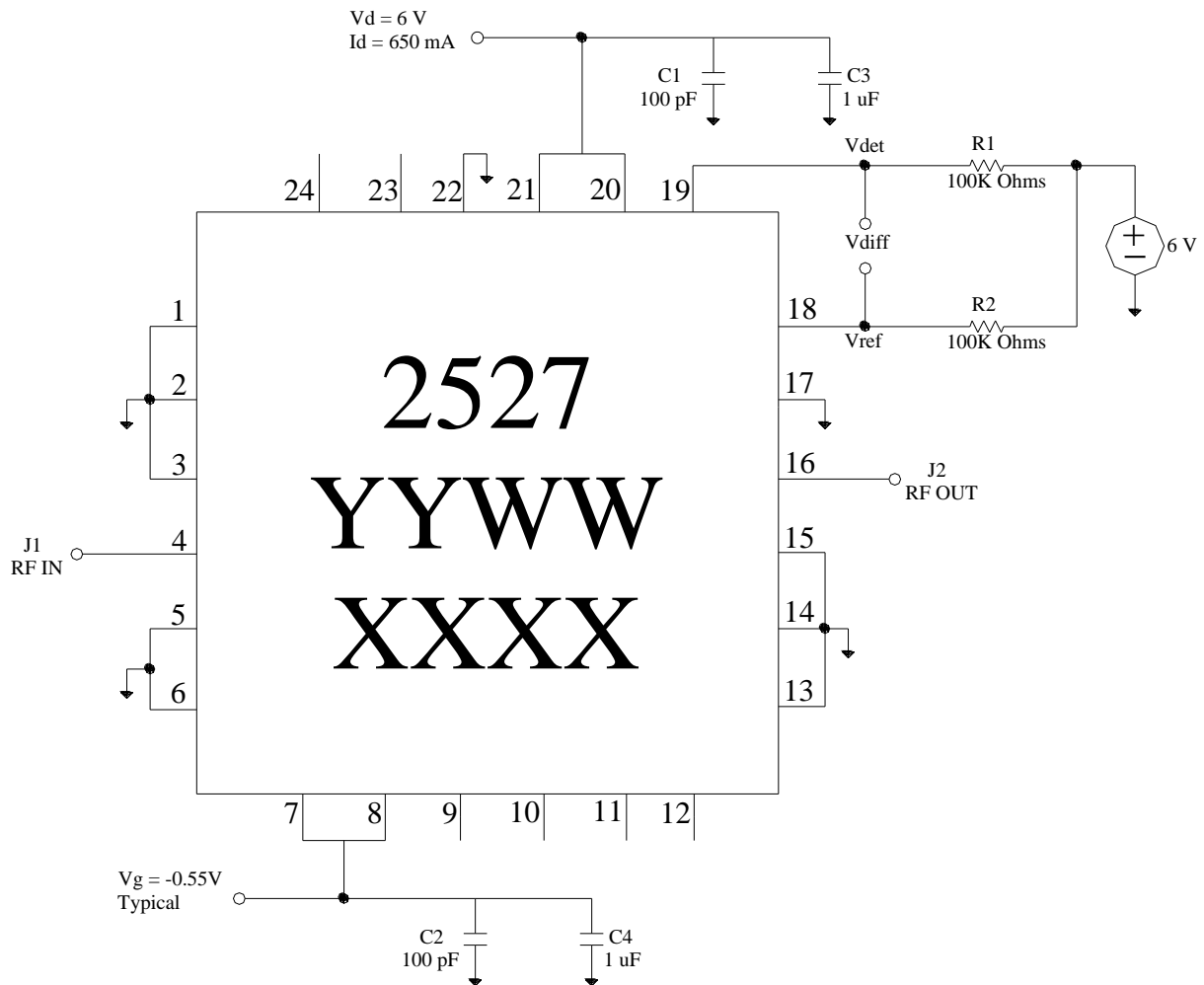
Typical Performance (cont.)



Typical Performance (cont.)



Application Circuit



Vg and Vd can be biased from either side, and the non-biased side can be left open.
 (Vg are either pins 7 and 8 or pins 23 and 24, Vd are either pins 10 and 11 or pins 20 and 21)

Bias-up Procedure

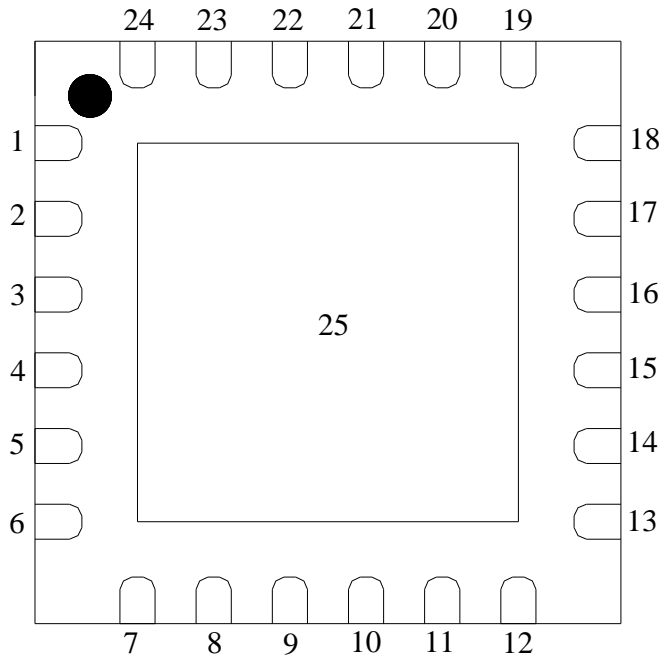
- Vg set to -1.5 V
- Vd set to +6 V
- Adjust Vg more positive until quiescent Id is 650mA.
This will be ~ Vg = -0.55 V
- Apply RF signal to RF Input

Bias-down Procedure

- Turn off RF supply
- Reduce Vg to -1.5V. Ensure Id ~ 0 mA
- Turn Vd to 0 V
- Turn Vg to 0 V

The TGA2527-SM will be marked with the “2527” designator and a lot code marked below the part designator. The “YY” represents the last two digits of the year the part was manufactured, the “WW” is the work week, and the “XXXX” is an auto-generated number.

Pin Description



| Pin | Symbol | Description |
|-------------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 2, 3, 5, 6, 13, 14, 15, 17 | N/C | No internal connection; must be grounded on PCB |
| 4 | RF IN | Input, matched to 50 ohms |
| 7, 8, 23, 24 | V _g | Gate voltage. ESD protection included; Bias network is required; can be biased from either side (pins 7 and 8 or pins 23 and 24), and non-biased side can be left opened; see Application Circuit on page 7 as an example. |
| 9, 12 | N/C | No internal connection. Can be grounded on PCB or left open |
| 10, 11, 20, 21 | V _d | Drain voltage. Bias network is required; can be biased from either side (pins 10 and 11 or pins 20 and 21), and non-biased side can be left opened; see Application Circuit on page 7 as an example. |
| 16 | RF OUT | Output, matched to 50 ohms |
| 18 | V _{ref} | Reference diode output voltage. |
| 19 | V _{det} | Detector diode output voltage. Varies with RF output power. |
| 22 | GND | Internal grounding; can be grounded on PCB or left open |
| 25 | GND | Backside Paddle. Multiple vias should be employed to minimize inductance and thermal resistance; see Mounting Configuration on page 11 for suggested footprint. |

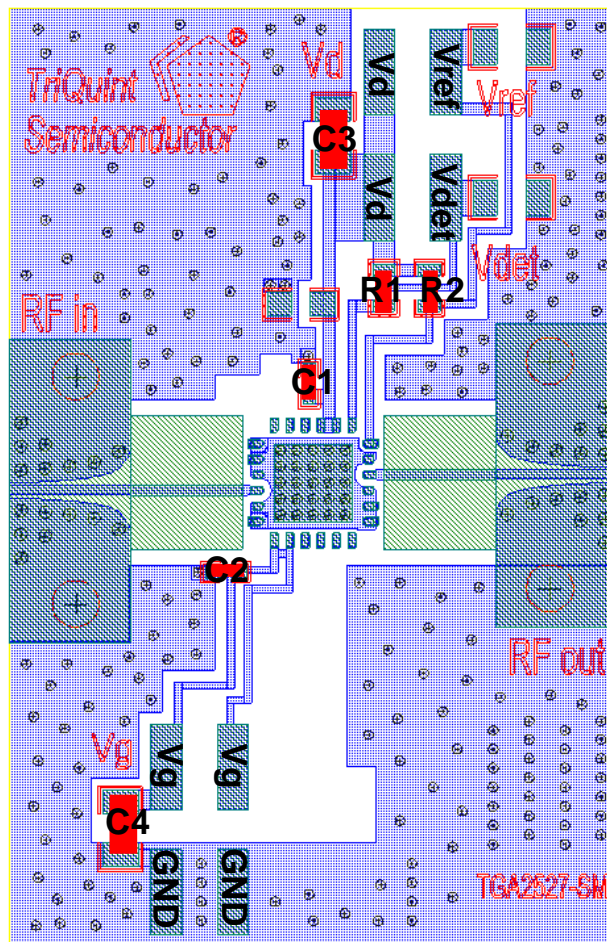
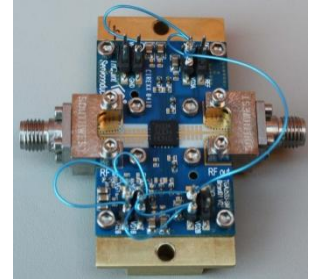
Applications Information

PC Board Layout

Top RF layer is 0.008” thick Rogers RO4003, $\epsilon_r = 3.38$. Metal layers are 1-oz copper. Microstrip 50 Ω line detail: width = 0.0175”.

The pad pattern shown has been developed and tested for optimized assembly at TriQuint Semiconductor. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

For further technical information, refer to the [TGA2527-SM](#) Product Information page.



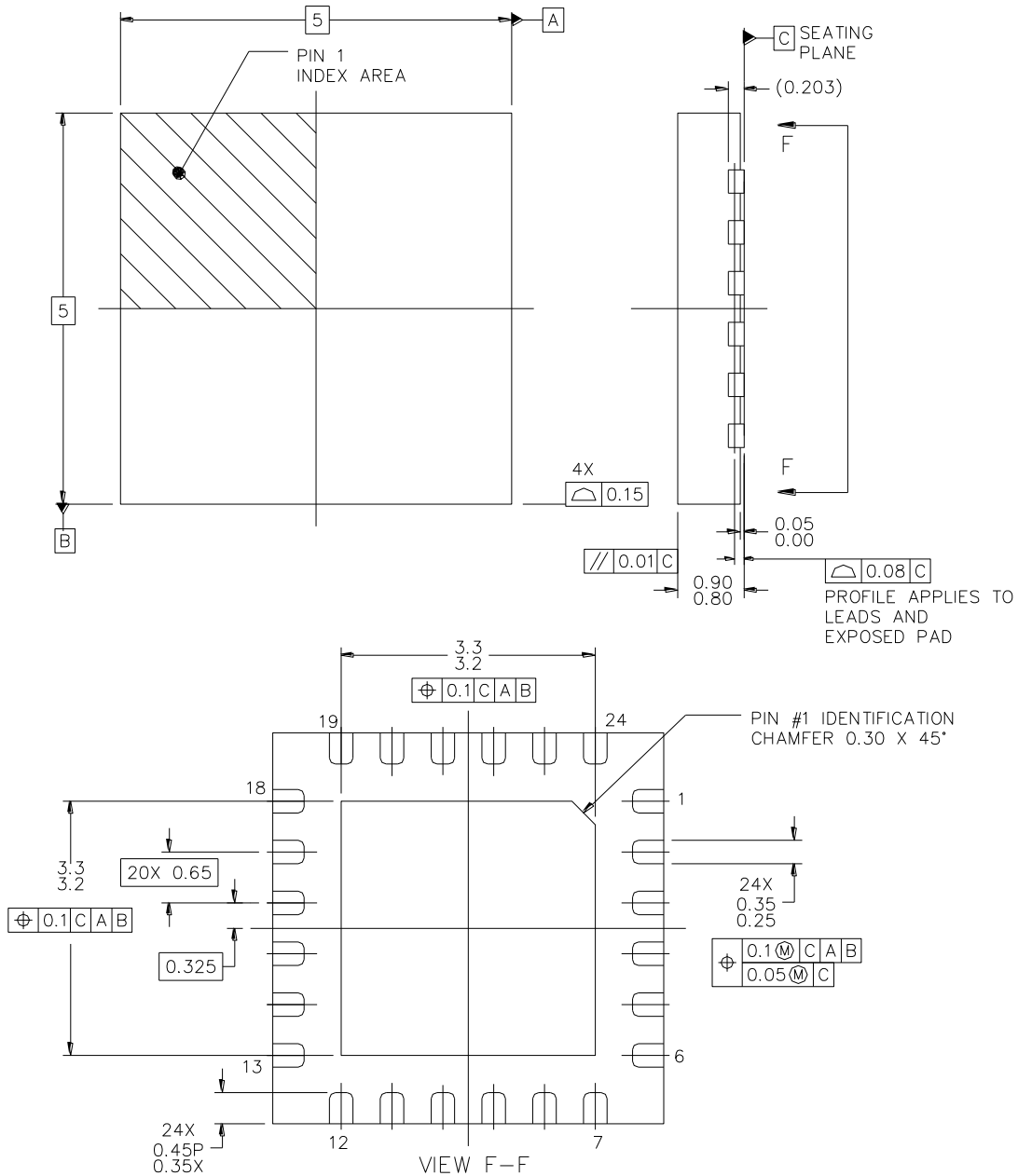
Bill of Material

| Ref Des | Value | Description | Manufacturer | Part Number |
|---------|-----------|---------------------------|--------------|-------------|
| C1, C2 | 100 pF | Cap, 0402, 50 V, 5%, COG | various | |
| C3, C4 | 1 uF | Cap, 0603, 25 V, 10%, X5R | various | |
| R1, R2 | 100K Ohms | Res, 0603, 1/16W, 5%, SMD | various | |

Mechanical Information

Package Information and Dimensions

All dimensions are in millimeters.



This package is lead-free/RoHS-compliant with a copper alloy base (CDA194), and the plating material on the leads is 100% matte Sn. It is compatible with both lead-free (maximum 260 °C reflow temperature) and tin-lead (maximum 245 °C reflow temperature) soldering processes.

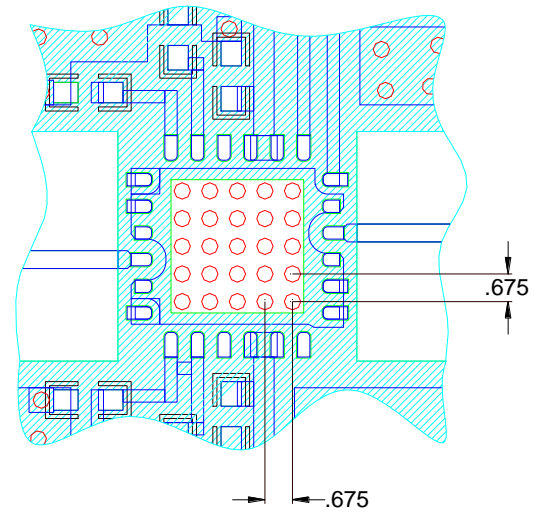
Mechanical Information (cont.)

Mounting Configuration

All dimensions are in millimeters (inches).

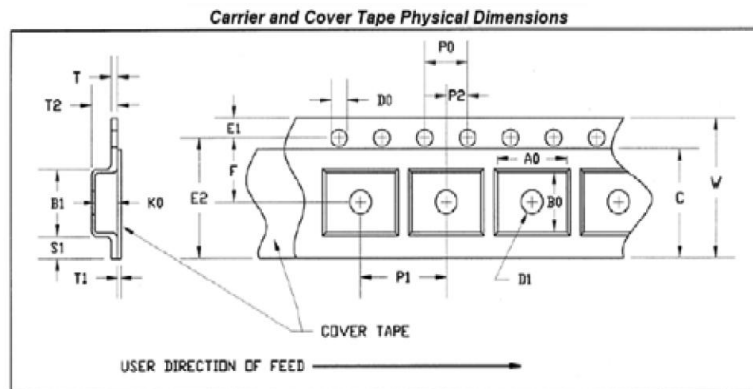
Notes:

1. A heatsink underneath the area of the PCB for the mounted device is recommended for proper thermal operation.
2. Ground / thermal vias are critical for the proper performance of this device. Vias have a final plated thru diameter of .40 mm (.016").



Tape and Reel Information

Tape and reel specifications for this part are also available on the TriQuint website in the “Application Notes” section. Standard T/R size = 500 pieces on a 7 x 0.5” reel.



CARRIER AND COVER TAPE DIMENSIONS

| Part | Feature | Symbol | Size (in) | Size (mm) |
|-----------------------------|----------------------------------------|--------|-----------|-----------|
| Cavity | Length | A0 | 0.207 | 5.25 |
| | Width | B0 | 0.207 | 5.25 |
| | Depth | K0 | 0.043 | 1.10 |
| | Pitch | P1 | 0.315 | 8.00 |
| Distance Between Centerline | Cavity to Perforation Length Direction | P2 | 0.079 | 2.00 |
| | Cavity to Perforation Width Direction | F | 0.217 | 5.50 |
| Cover Tape | Width | C | 0.374 | 9.5 |
| Carrier Tape | Width | W | 0.472 | 12.0 |

Product Compliance Information

ESD Information



Caution! ESD-Sensitive Device

ESD Rating: TBD
 Value: Passes \geq TBD min
 Test: Human Body Model (HBM)
 Standard: JEDEC Standard JESD22-A114

MSL Rating

Level MSL1 at +260 °C convection reflow
 The part is rated Moisture Sensitivity Level MSL1 at 260°C per JEDEC standard IPC/JEDEC J-STD-020.

ECCN

US Department of Commerce 3A001.b.2.c

Solderability

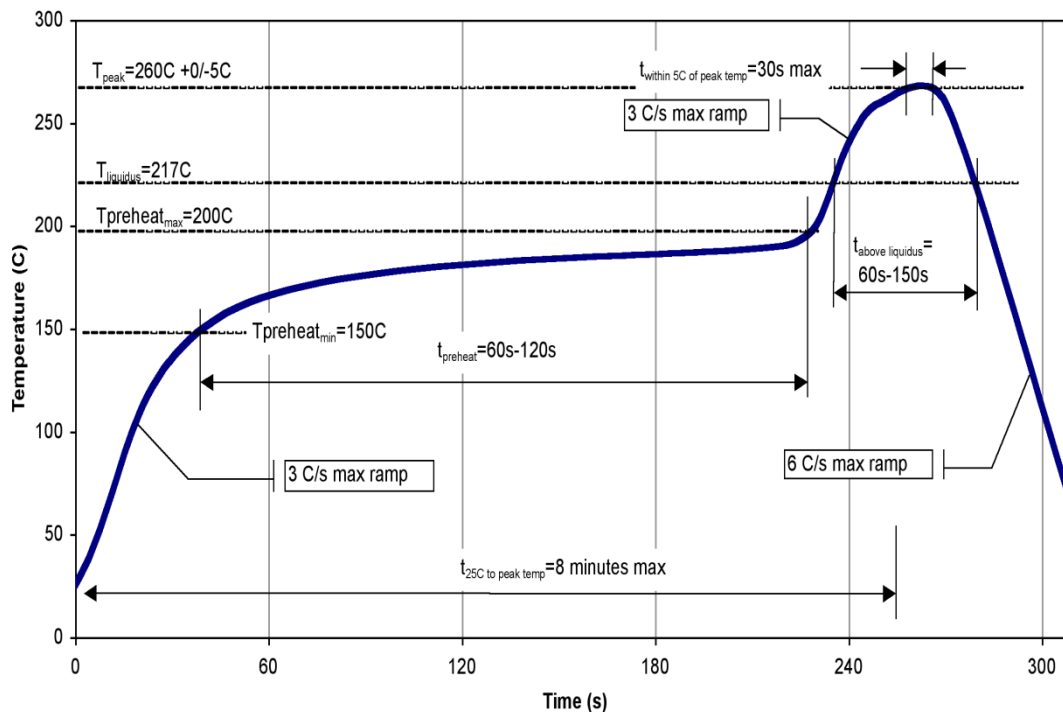
Compatible with the latest version of J-STD-020, Lead free solder, 260°C

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free

Recommended Soldering Temperature Profile



TGA2527-SM

Ku-Band Power Amplifier



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations, and information about TriQuint:

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